SAFETY PRACTICES

FOR STRUCTURE INSPECTIONS

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Ontario Ministry of Transportation and Communications
Honourable Mr. Ed Fulton, Minister
D.G. Hobbs, Deputy Minister
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PREFACE

The safety practices for structure inspections carried out by or for the Ministry are governed by:

- The requirements of the Ontario Occupational Health and Safety Act and Ontario Regulations for Construction Projects and for Industrial Establishments, Revised Regulations of Ontario 1980.
- M.T.C. Directives related to safety.
- Uniform Traffic Control Devices of Ontario Manual, Part 5: Roadway Work Operations.
- Safety practices given in this manual.

Notes:

1. The Uniform Traffic Control Devices of Ontario Manual, Part 5: Roadway Work Operations is under revision and scheduled for issue in June 1987. A supplement to that manual governing short term operations of less than a day is scheduled for issue in the summer of 1987.

2. The safety practices contained here will be reviewed and updated, as necessary, to comply with the new version of the Uniform Traffic Control Devices of Ontario Manual, Part 5: Roadway Work Operations and the new supplement to it.

3. It is recommended that the training indicated in Section 4 should be completed within a period of about one year.

1. INTRODUCTION

Structure inspections shall be carried out in a safe manner. The safety of the inspectors and the public using the structure should be ensured at all times. Most accidents can be prevented if the inspections are planned and carried out with safety in mind.

2. RESPONSIBILITY

2.1 MINISTRY

The Ministry is responsible for ensuring that:

- policies and procedures affecting structure inspection safety are established;

- adequate training is provided;

- protective clothing, safety devices and equipment are available.

2.2 OFFICE SUPERVISOR

The office supervisor is responsible for ensuring that:

- inspection staff are aware of and follow policies and procedures affecting structure inspection safety;

- inspection staff are properly trained;

- inspection staff are adequately equipped with protective clothing, safety devices and equipment.

- Safety devices and equipment are properly maintained and in good working condition.

2.3 SITE SUPERVISOR

The site supervisor is responsible for planning for the inspection and for ensuring that:

- adequate precautions are taken against hazardous situations;

- inspection staff follow the safety policies and procedures;

- inspection staff wear required safety clothing and devices;

- safety equipment and devices are properly used;

- appropriate actions against any unsafe acts or situations are taken.

2.4 FIELD PERSONNEL

The inspectors and assistants are responsible for:

- following the established safety policies and procedures;
- wearing safety clothing and devices;
- using safety equipment properly;
- identifying and reporting any defective safety clothing, devices and equipment;
- identifying and taking appropriate actions against any unsafe situations;
- advising supervisor of any physical impairment that might affect his own ability to safely perform inspection duties.

3. STAFFING

3.1 GENERAL

For safety purposes, the structure inspection crew shall consist of a minimum of two persons, one of whom shall be designated the site supervisor.

3.2 WATER

When working in or around water of sufficient depth or current to pose a risk of drowning, the crew shall consist of a minimum of three persons. At least two workers shall be available for a rescue operation, one of whom shall be stationed away from the water but in continuous sight or voice contact with those in the water.

3.3 ICE

When working on ice the crew shall consist of a minimum of three persons. At least two workers shall be available for a rescue operation, one of whom shall be stationed off the ice but in continuous sight or voice contact with those on the ice.

3.4 CONFINED SPACES

When working inside confined spaces, such as steel box girders, the crew shall consist of a minimum of three persons. At least two workers shall be available for a rescue operation, one of whom shall be stationed outside the confined space but in continuous sight or voice contact with those in the confined space.

3.5 ADDITIONAL STAFF REQUIREMENTS

The site supervisor shall determine any additional staffing requirements based upon specific site conditions.

4. TRAINING

All inspection and supervising staff who are assigned to the inspection of structures must be trained in safety and in the proper use of safety equipment.

Training requirements for inspection and supervisory staff are given in Table 1. Courses in Defensive Driving and Traffic Control and Protection would also be of benefit and should be considered in addition to those in Table 1.

	OFFICE SUPERVISORS		SITE SUPERVISORS		INSPECTORS/ ASSISTANTS	
	Must	Should	Must	Should	Must	Should
NTC Courses						
Keyman Programme	X			X		
Accident Investigation	X			X		
Workplace Inspection	X		X			
Equipment Safety, Routine	X		X		X	
First Aid		X		X		
CSAO Course						
Seminar on Health & Safety Act (This course is tailored for the people who attend.)		X				
IAPA Courses						
Safety and Health in Induction Training		X				
Safety, Health and the Law		X				
Equipment Safety, Special		X	X		X	

Table 1 - Training Requirements

NOTES: - first aid course must be updated every 3 years;
- at least one member present on the inspection team must have a valid St. John's Ambulance Emergency First Aid Certificate or equivalent.

CSAO - Construction Safety Association of Ontario
IAPA - Industrial Accident Prevention Association
MTC - Ministry of Transportation and Communications

5. EMERGENCY EQUIPMENT

A first aid kit containing a minimum of the following items shall be provided and carried in the inspection vehicle. This kit is adequate for a crew of 6 to 15 people.

(a) a current edition of a standard St. John Ambulance First Aid Manual;

(b) 1 card of safety pins;

(c) dressings consisting of

(i) 24 adhesive dressings individually wrapped;

(ii) 12 sterile gauze pads, 75 mm square;

(iii) 4 rolls of 50 mm gauze bandage;

(iv) 4 rolls of 100 mm gauze bandage;

(v) 4 sterile surgical pads suitable for pressure dressing, individually wrapped;

(vi) 6 triangular bandages;

(vii) 2 rolls of splint padding; and

(viii) 1 roll-up splint.

(d) a pair of scissors.

6. PLANNING

Inspections should be scheduled to avoid peak traffic periods and should be discontinued if the inspection creates a hazard to the inspection crew or the public, or creates unacceptable interference with the flow of traffic.

At the commencement of each inspection the site supervisor shall:

- Review the work to be done in the particular job.

- Discuss with crew members, the hazards inherent in the work to be done and establish appropriate ways of dealing with these hazards.

During the inspection, the site supervisor shall:

- Monitor changing traffic volumes, sight distances, water levels, ice conditions, atmosphere and weather conditions and take appropriate action such as placing additional signs or cones or removing crew members from the site.

7. TRAFFIC CONTROL

7.1 GENERAL

The purpose of traffic control devices is to warn motorists of work in progress, minimize risk of injury to the public and the inspection crew, and protect the inspection vehicle from collision damage.

At the commencement of the inspection, the site supervisor shall have the necessary traffic control devices placed in accordance with the MTC Uniform Traffic Control Devices of Ontario Manual, Part 5: Roadway Work Operations. Figures 1 to 6, on pages 7 thru 12, are interpretations of these requirements as applicable to structure inspections.

Signs and cones for traffic control shall be placed so as to be clearly visible.

Signs and cones, where practicable, shall be positioned and removed using the inspection vehicle with the roof light operating as a warning device.

Signs are to be covered or removed when the inspection crew is not working on that portion of roadway on which the signs are placed.

The site supervisor may adjust the number and/or placement of signs and traffic control devices as may be dictated by specific site situations; however, any modifications shall meet the minimum requirements.

For inspections requiring lane closure, special vehicles and/or where additional traffic control is required, assistance is available from the Districts.

7.2 INSPECTION VEHICLE AND BASIC EQUIPMENT

The inspection vehicle shall be clearly identified as a Ministry vehicle by signs mounted on the driver's and passenger's side panels.

The inspection vehicle shall carry the following minimum traffic control devices.

- one flashing orange roof light.

- two TC-2A Men at Work signs with portable stand, flag poles and flags.

- three 450 mm blaze orange traffic cones.

7.3 INSPECTIONS NOT REQUIRING TRAFFIC CONTROL

Traffic control devices may be omitted if all the following conditions are met:

- the inspection vehicle is parked off the travelled portion of the roadway, shoulders or median;
- the inspection can be carried out from an area normally used by pedestrians;
- the inspection crew do not encroach onto the travelled portion of the roadway or the shoulders, except when crossing the roadway using a designated pedestrian crossing.

7.4 INSPECTIONS CONFINED TO WORK FROM THE SHOULDERS

Traffic control shall be provided as shown in Figure 1.

The signs and/or the vehicle are on the same shoulder as the inspectors.

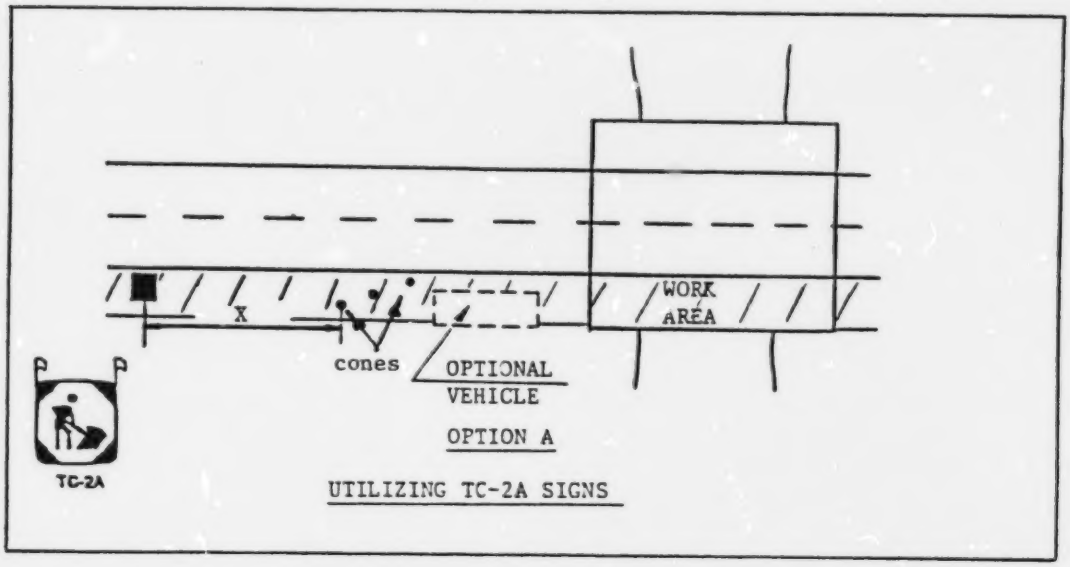
7.5 INSPECTIONS REQUIRING WORK ON THE TRAVELLED PORTION OF THE ROADWAY

Traffic control shall be provided as shown in Figures 2 to 6.

The flashing roof light shall be operating when the inspection crew is working on the travelled portion of the roadway.

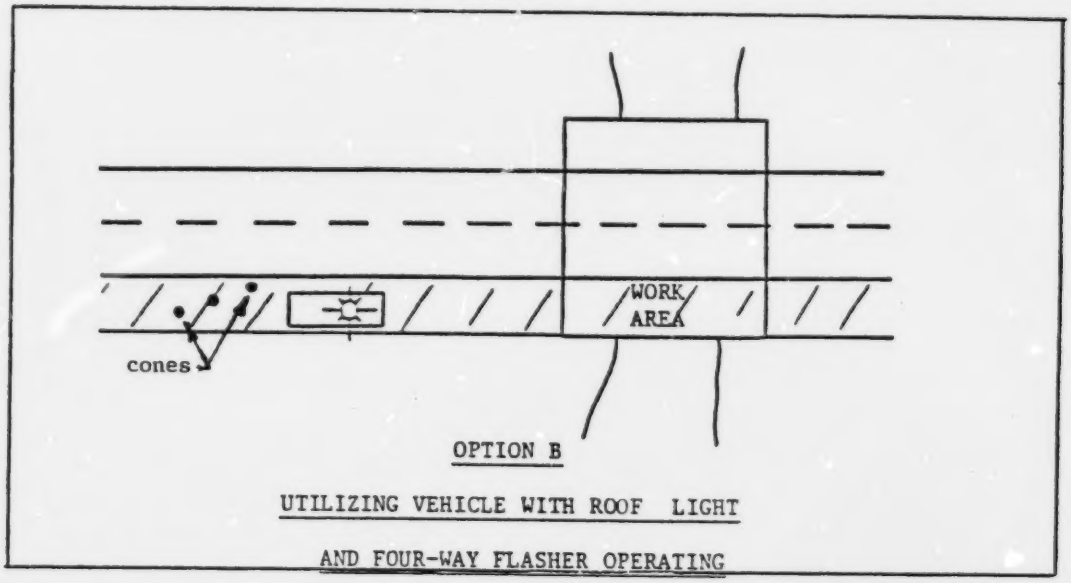
7.6 INSPECTIONS ON LOW VOLUME, NARROW ROADS

On low volume roads (less than 500 vehicles per day) when the vehicle cannot be parked off the roadway, due to inadequate road width, the vehicle may be parked and signed as shown in Figure 6.



OPTION A

UTILIZING TC-2A SIGNS



OPTION B

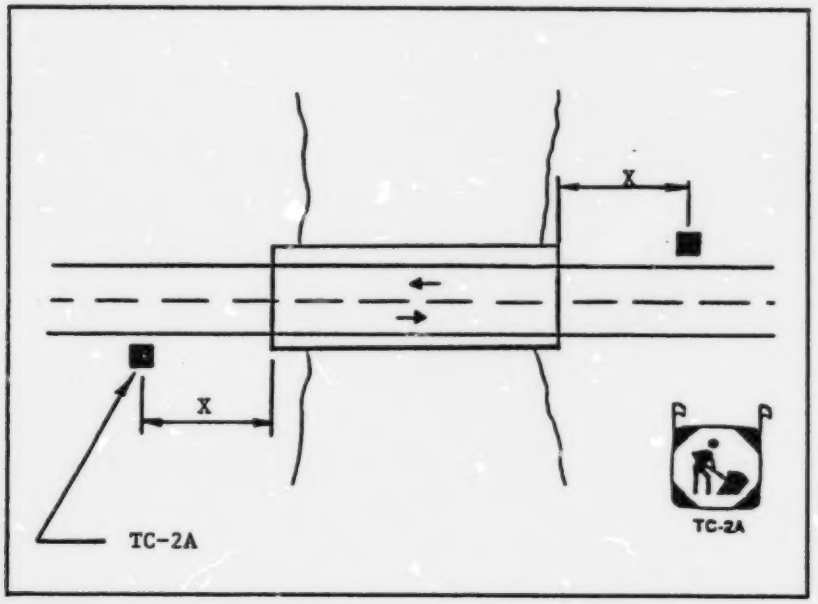
UTILIZING VEHICLE WITH ROOF LIGHT

AND FOUR-WAY FLASHER OPERATING

	Regulatory Speed Limit	60 km/h or less	70 km/h or greater
X	Distance Between Const. Signs(m)	20 - 30	50 - 60

FIGURE 1

WORK AREA CONFINED TO SHOULDERS

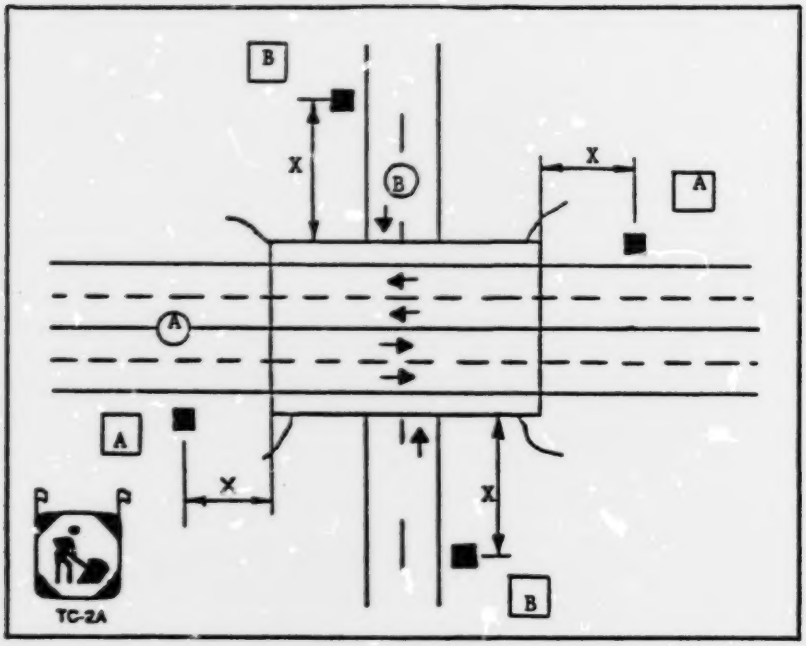


	Regulatory Speed Limit	60 km/h or less	70 km/h or greater
X	Distance Between Const. Signs(m)	20 - 30	50 - 60

FIGURE 2

2 & 4 LANE UNDIVIDED ROADWAY

OVER WATER/RAILWAY



	Regulatory Speed Limit	60 km/h or less	70 km/h or greater
X	Distance Between Const. Signs(m)	20 - 30	50 - 60

○ INSPECTION AREA

□ SIGNING REQUIREMENT FOR INSPECTION AREA

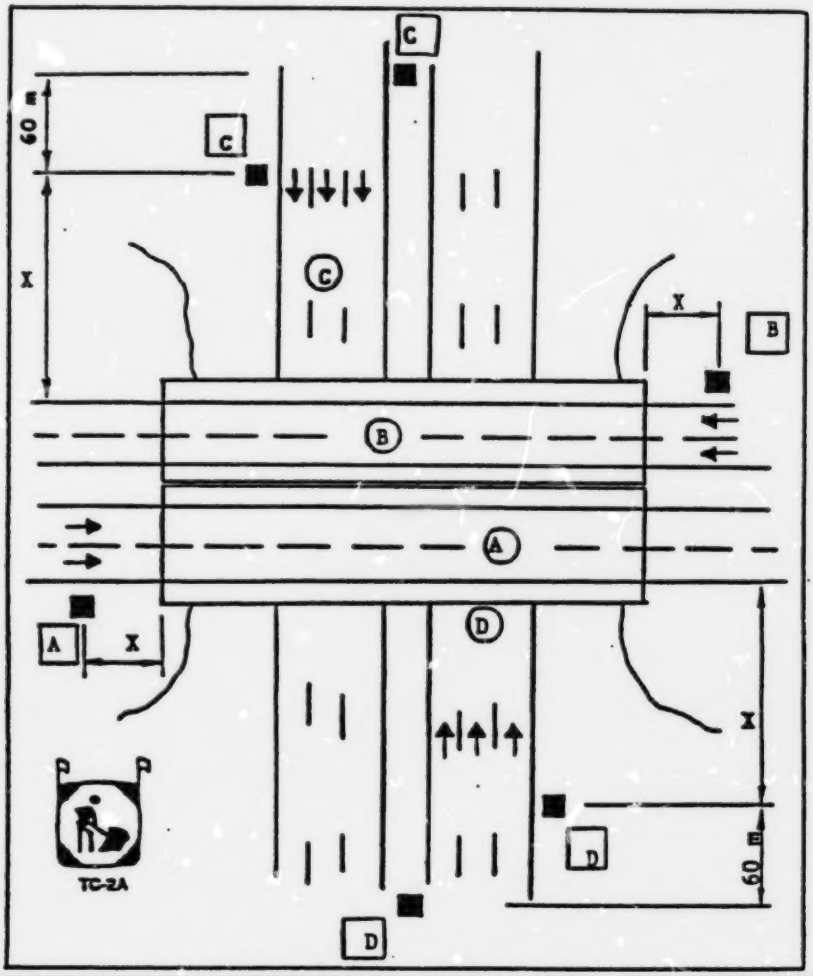
NOTE: INSPECTIONS MAY BE STAGED TO REDUCE THE NUMBER OF SIGNS ERECTED AT ANY ONE TIME

FIGURE 3

2 & 4 LANE UNDIVIDED ROADWAYS

- NOTE: A TC-12 SIGN IS REQUIRED FOR WORK AREAS ON FREEWAYS WITH TRAFFIC VOLUMES IN EXCESS OF 25000 AND OPTIONAL ON REMAINING FREEWAY SECTIONS AT THE SUPERVISOR'S DISCRETION

LANE CLOSURE ARROW
TC-12A (120 x 120)



	Regulatory Speed Limit	60 km/h or less	70 - 90 km/h	90 km/h or less Freeway	100 km/h Freeway
X	Distance Between Const. Signs(m)	20 - 30	50 - 60	180	200

○ INSPECTION AREA

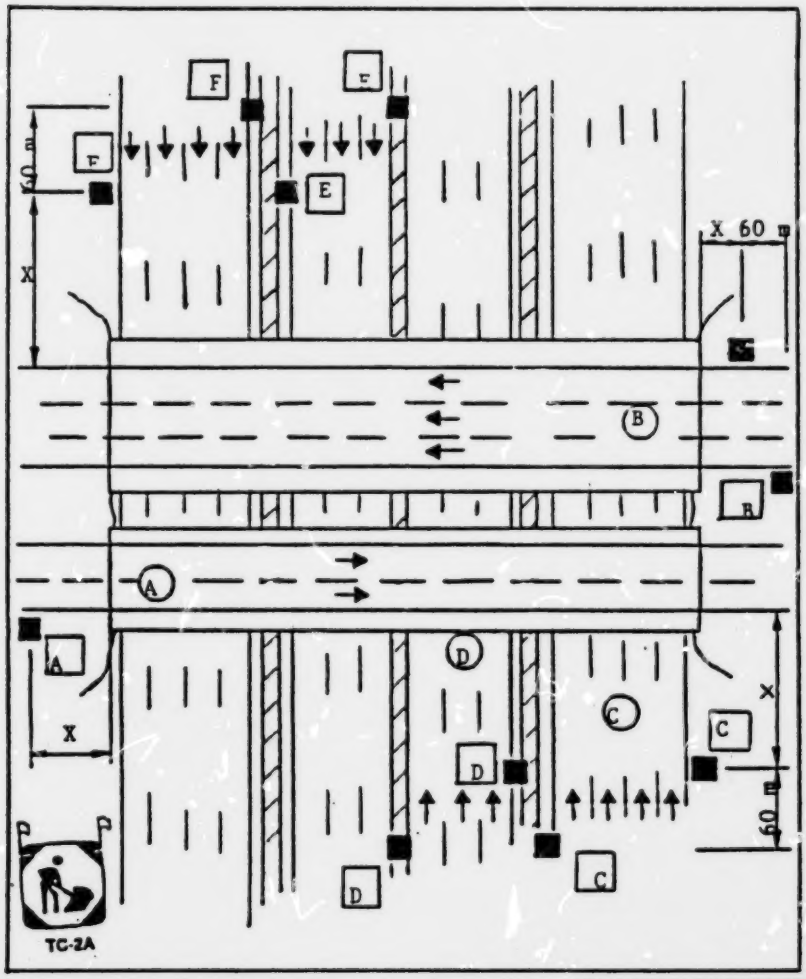
□ SIGNING REQUIREMENT FOR INSPECTION AREA

NOTE: INSPECTIONS MAY BE STAGED TO REDUCE THE NUMBER OF SIGNS ERECTED AT ANY ONE TIME

FIGURE 4
4 & 6 LANE DIVIDED ROADWAYS

NOTE: A TC-12 SIGN IS REQUIRED FOR WORK AREAS ON FREEWAYS WITH TRAFFIC VOLUMES IN EXCESS OF 25000 AND OPTIONAL ON REMAINING FREEWAY SECTIONS AT THE SUPERVISOR'S DISCRETION

LANE CLOSURE ARROW
TC-12A (120 x 120)



	Regulatory Speed Limit	60 km/h or less	70 - 90 km/h	90 km/h or less Freeway	100 km/h Freeway
X	Distance Between Const. Signs(m)	20 - 30	50 - 60	180	200

○ INSPECTION AREA

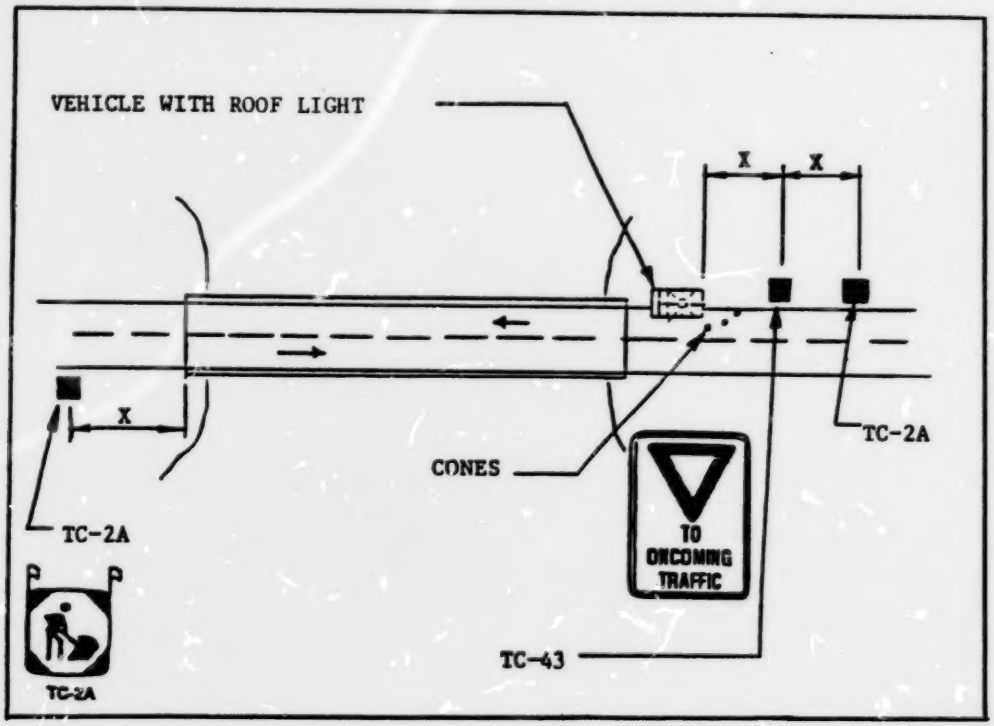
□ SIGNING REQUIREMENT FOR INSPECTION AREA

NOTE: INSPECTIONS MAY BE STAGED TO REDUCE THE NUMBER OF SIGNS ERECTED AT ANY ONE TIME

FIGURE 5

MULTI ROADWAY LOCATION

CORE- COLLECTOR



	Regulatory Speed Limit	60 km/h or less	70 km/h or greater
X	Distance Between Const. Signs(m)	20 - 30	50 - 60

FIGURE 6

LOW TRAFFIC ROADWAY

VEHICLE ENCROACHMENT ON PAVEMENT

8. PROTECTIVE CLOTHING AND SAFETY EQUIPMENT

8.1 GENERAL

Each member of the inspection crew shall wear the following minimum amount of personal protective clothing whenever working on the right-of-way:

- safety hard hat with chin strap;
- fluorescent blaze orange vest with yellow reflective stripes; (note that this vest is not to be worn when working on railway tracks.)
- safety footwear with steel toe, or steel toe and sole.

The minimum additional requirements for protective clothing and safety equipment for various hazardous situations are given in Sections 8.2 to 8.6.

Additional protective clothing and/or safety equipment shall be worn and/or used as directed by the site supervisor.

8.2 FALLING

The following additional safety equipment shall be used when there is a risk of falling over 3 m:

- safety net, or
- safety belt/harness with lanyard fastened to a fixed support or life line.

This safety equipment is not required when working on a bridge deck that has adequate railing protection as defined in the Ontario Occupational Health and Safety Act, Ontario Regulation 691/80, Sect. 59.

8.3 WATER

The additional safety equipment given in Table 2 shall be used when there is a risk of drowning by falling into water, or where there is a current in the water.

The risk of falling into water does not exist if:

- the worker stays at least 2 m away from the edge of water, or from the edge of a steep slope leading into the water;
- the worker wears a safety belt with lanyard fastened to a fixed support;
- there is a guardrail, as defined in the Ontario Occupational Health and Safety Act, Ontario Regulation 691/80, Sect. 59, between the worker and the water.

Depth of Water	Safety Equipment
0 - 0.3 m	- no special equipment required.
0.3 - 1.0 m	- safety floatation line across stream. - life jackets.
1.0 - 1.5 m	- safety floatation line across stream, approximately 8 m downstream from worksite; - life jackets; - ring buoy with 15 m of 9.5 mm rope. - whistle, horn or 2-way walkie-talkie.
more than 1.5 m	- safety floatation line across stream approximately 8 m downstream from worksite - life jackets; - safety belt/harness with lanyard fastened to a fixed support; - boat and equipment for rescue; - whistle, horn or 2-way walkie-talkie.

Table 2 - Additional Safety Equipment in Water

Notes:

1. The safety floatation line, shown in Table 2, is not required where there is no current in the water. If it is not reasonable or practical to put a safety floatation line across the stream then alternative precautions shall be considered.

2. On navigable waters the waterway authority shall be contacted prior to installation of a safety floatation line across the stream.

8.4 ICE

The following additional safety equipment shall be used when there is risk of drowning by falling through the ice.

- auger or equivalent;
- thermal floatation suit;
- change of clothes or blanket;
- ring buoy with 15 m of 9.5 mm rope;
- whistle, horn or 2-way walkie-talkie.

If there is a combination of open water and ice the requirements of Section 8.3 also apply.

The loads that ice would support are:

Load	Thickness (mm) Clear Blue Ice	Thickness (mm) Snow ice
Workers in single file	75	115

The thickness of the ice should be measured by augering through the ice, and the quality of ice judged visually. Measurements should be taken at no more than 15 m apart. Where strong currents or sewer outlets occur, test holes should be closer.

When testing, workers should use long poles which could be used for rescue in case of a breakthrough.

If a well defined path of travel is constantly used to get to and from the worksite the ice thickness along it should be checked regularly.

Structure inspections from the ice shall be discontinued if:

- the minimum thicknesses are not met;
- if the ice is grey, which results after a thaw and indicates presence of water;
- there is water on the ice;
- if radial cracks develop;
- if continuous cracking is observed or heard;
- if sagging is observed.

8.5 CONFINED SPACES

The following additional safety equipment shall be used when in a confined space:

- air testing equipment;
- flashlight or other suitable lighting;
- whistle, horn or 2-way walkie-talkie.

Structure inspections in confined spaces shall not be carried out unless the air quality has been tested and found to be adequate.

8.6 OTHER HAZARDS

Hazard	Equipment
a) Eye injury	Safety glasses
b) Hand injury	Safety gloves
c) Hearing damage	Hearing protection
d) Damage to personal clothing	Coveralls

9. REFERENCES

Section 2: Responsibilities

2.1 Ministry

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980; Chap. 321, Sect. 14 and 15, Duties of Employers

Ontario Ministry of Transportation and Communications
Administrative Safety Directives:
- A-1: Occupational Health and Safety
- B-3: Joint Health and Safety Committee Structure

2.2 Office Supervisor

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980; Chap. 321, Sect. 16, Duties of Supervisors

Ontario Ministry of Transportation and Communications
Administrative Safety Directives:
- A-1: Occupational Health and Safety
- B-3: Joint Health and Safety Committee Structure
- C-3: Keyman Programme

2.3 Field Supervisor

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980; Chap. 321, Sect. 16, Duties of Supervisors and Sect. 17, Duties of Employees

Ontario Ministry of Transportation and Communications
Administrative Safety Directives:
- A-1: Occupational Health and Safety
- A-2: Workers Compensation
- C-3: Keyman Programme

2.4 Field Personnel

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980; Chap. 321, Sect. 17, Duties of Employees

Ontario Ministry of Transportation and Communications
Administrative Safety Directives:
- A-1: Occupational Health and Safety
- A-2: Workers Compensation
- B-3: Joint Health and Safety Committee Structure
- C-3: Keyman Programme

Section 3: Staffing

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980;
Ontario Regulation 691/80; Sect. 37.1
Ontario Regulation 691/80; Sect. 119.3(c)

Memorandum by I.V. Oliver, Executive Director, Highway Operations and Maintenance, Ontario Ministry of Transportation and Communications; dated April 8,1986.

Section 4: Training

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980;
Ontario Regulation 691/80; Sect. 29

Ontario Ministry of Labour; Workmens Compensation Act,
First Aid Regulations (950), Sections 1.2, 8.2, and 13.
Ontario Regulation 6/71, Instruction and Training

Ontario Ministry of Transportation and Communications;
Administrative Safety Directives:
B-5: First Aid and Cardio- Pulmonary Resuscitation Training
C-3: Keyman Programme

Notes:

1. Equipment Safety-Routine Courses are provided by the Occuptional Health and Safety staff. These courses are concerned with general safety practices covering Hand Protection, Protective Headwear, Hearing Protection, Eye and Face Protection, Foot Protection, and Protective Clothing. These courses are generally combined into a one-half day course.

2. Equipment Safety-Special Courses are concerned with safety equipment such as ladders, lanyards, safety belts, scaffolding, harnesses, boats etc., as well as working in more hazardous conditions such as working over water, on ice, high level work, or in confined spaces. These courses should be arranged through the Occuptional Health and Safety staff.

Section 5: Emergency Equipment

Ontario Ministry of Labour; Workmens Compensation Act,
First Aid Regulations (950), Sections 8, 9, and 16.

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980;
Ontario Regulation 691/80; Sect. 37

Section 7: Signing and Traffic Control

7.1 General

Ontario Ministry of Transportation and Communications:
Uniform Traffic Control Devices of Ontario Manual, Part 5: Roadway Work Operations;
(see Preface Note 1.)

7.2 Inspection Vehicle and Basic Equipment

Ontario Ministry of Transportation and Communications:
Uniform Traffic Control Devices of Ontario Manual, Part 5: Roadway Work Operations;
(see Preface Note 1.)

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980;
Ontario Regulation 691/80; Sect. 17 and Sections 24 to 27

7.3 Inspections not Requiring Traffic Control

Ontario Ministry of Transportation and Communications:
Uniform Traffic Control Devices of Ontario Manual, Part 5: Roadway Work Operations;
(see Preface Note 1.)

7.4 Inspections Confined to Work on the Shoulder

Ontario Ministry of Transportation and Communications:
Uniform Traffic Control Devices of Ontario Manual, Part 5: Roadway Work Operations;
(see Preface Note 1.)

7.5 Inspections Requiring Work on the Travelled Portion of the Roadway

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980;
Ontario Regulation 691/80; Sections 120, 122 and 130

Ontario Ministry of Transportation and Communications:
Uniform Traffic Control Devices of Ontario Manual, Part 5: Roadway Work Operations;
(see Preface Note 1.)

Ontario Ministry of Transportation and Communications:
Administrative Safety Directive C-11: Protection of M.T.C. Employees on Highways

7.6 Inspections on Low Volume, Narrow Roadways

Ontario Ministry of Transportation and Communications:
Uniform Traffic Control Devices of Ontario Manual, Part 5: Roadway Work Operations;
(see Preface Note 1.)

Section 8: Protective Clothing and Safety Equipment

8.1 General

Canadian Standards Association Standards:
194.3-M1982, Z259.4-M1979, 294.1-M1977.

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980;
Ontario Regulation 691/80; Sections 26, and 28 to 33

Ontario Ministry of Labour; Workmens Compensation Act,
Regulation 833, Section 16

Ontario Ministry of Transportation and Communications
Administrative Safety Directives:
- A-1 : Occupational Health and Safety
- C-5 : Foot Protection
- C-6 : Head Protection
- C-13: Use of Seat Belt Assembly by Ministry Personnel
- C-14: Protective Clothing, Safety Equipment and Personal Protective Devices

8.2 Falling

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980;
Ontario Regulation 691/80; Sections 17, 35, 36, 59, and also Sections 68 to 87 inclusive

Ontario Ministry of Transportation and Communications
Administrative Safety Directive C-15: Fall Arresting Equipment

Canadian Standards Association Standards:
Z259.1-M1976, Z259.2-M1979, Z259.3-M1978,

8.3 Water

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980;
Ontario Regulation 691/80; Sections 36, 37, and 59

Memorandum by I.V.Oliver, Executive Director, Highway Operations and Maintenance, Ontario Ministry of Transportation and Communications; dated April 8,1986.

Memorandum by H.K. Kirchner, Manager, Maintenance Operations Office, Ontario Ministry of Transportation and Communications; dated March 11, 1987.

8.4 Ice

"Snow, Ice and Permafrost" Research Establishment, Corps of Engineers, U.S. Army

"A Snowmobile Accident Study" R.W. McLay and S. Chism, 1969

8.5 Confined Spaces

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980;
Ontario Regulation 691/80; Section 119 (see also Sect. 16 to 19 and Sect. 38 to 40)

Ontario Ministry of Transportation and Communications;
Administrative Safety Directives:
C-10: Safety Practices for Entry Into Confined Spaces

8.6 Other Hazards

a) Eye Injury

Ontario Ministry of Transportation and Communications;
Administrative Safety Directive:
C-17: Eye and Face Protection

Ontario Ministry of Labour; Occupational Health and Safety Act, Revised Statutes of Ontario, 1980;
Ontario Regulation 691/80; Section 32

CSA Standard Z94.3-1969

b) Hand Injury

Ontario Ministry of Transportation and Communications;
Administrative Safety Directive:
C-16: Hand Protection

c) Hearing Damage

Ontario Ministry of Transportation and Communications;
Administrative Safety Directive:
B-2: Hearing Conservation Program

d) Damage to Personal Clothing

Ontario Ministry of Transportation and Communications;
Administrative Safety Directive:
C-14: Protective Clothing, Safety Equipment and Personal Protective Devices